Xingxing Liu

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Work Status

I am a 4th year Ph.D. student at University of Iowa. I am actively seeking for **an internship position for summer 2023**. I am broadly interested in **machine learning**, **computer vision**, **medical image processing**, and **surgical navigation system development** positions.

Biography

I am a 4th year Ph.D. student majoring in Electrical and Computer Engineering at University of Iowa (Uiowa). Before joining Uiowa, I earned my Bachelor's degree in Applied Physics from University of Science and Technology of China (2019). My research mainly focuses on combining cutting-edge technologies in both hardware and software to develop surgical navigation systems. My research projects involve optical imaging, fluorescence imaging, medical image processing, machine learning, software graphical user interface (GUI) design, etc. These projects help to solidate my skills in these fields and make me qualified for research and working roles in them.

Research Keywords

- ❏ Medical Image Processing
- ❏ Healthcare AI
- ❏ Machine Learning
- ❏ Computer Vision
- ❏ Surgical Navigation
- ❏ Hardware-Software Codesign
- ❏ Fluorescence Imaging
- ❏ Optical Imaging System

Education

University of Iowa Aug. 2019 - May 2024 (expected)

Ph.D. in Engineering, Department of Electrical and Computer Engineering
Overall GPA: 3.58/4.0

University of Science and Technology of China Aug. 2014 - June 2019

B.S. in Applied Physics, Department of Modern Physics
Overall GPA: 3.32/4.3

Courses

- ❏ Multi-Dimensional Image Analysis Tools and Techniques
- ❏ Digital Image Processing
- ❏ Machine Learning
- ❏ Deep Learning
- ❏ Data Structure and Algorithm
- ❏ High Performance Computer Architecture
- ❏ C++

Skills

Programming Languages
- ❍ C++ (Advanced)
- ❍ Python (Advanced)
- ❍ Verilog (Intermediate)
- ❍ C# (Intermediate)

Tools
- ❍ Pytorch (Advanced)
- ❍ Tensorflow (Advanced)
- ❍ OpenCV (Intermediate)
- ❍ PCL (Intermediate)

Software
- ❍ 3D Slicer (Intermediate)
- ❍ Matlab (Intermediate)
- ❍ Qt Creator (Intermediate)
- ❍ Unity (Intermediate)

Publications

1. **Liu, Xingxing**, Quang, T., Deng, W., & Liu, Y. (2021). Deep convolutional feature-based fluorescence-to-color image registration. *2021 IEEE International Symposium on Medical Measurements and Applications (MeMeA)*. Retrieved from https://ieeexplore.ieee.org/abstract/document/9478607
2. **Liu, Xingxing**, Deng, W., & Liu, Y. (2021). Application of hybrid network of unet and feature pyramid network in spine segmentation. *2021 IEEE International Symposium on Medical Measurements and Applications (MeMeA)*. Retrieved from https://ieeexplore.ieee.org/abstract/document/9478765
3. Wang, L., Li, R., Sun, J., **Liu, Xingxing**, Zhao, L., Seah, H. S., ... Tandianus, B. (2019). Multi-view fusion-based 3d object detection for robot indoor scene perception. *Sensors*. Retrieved from https://www.mdpi.com/1424-8220/19/19/4092

Experience

University of Iowa

Graduate Research Assistant — Aug. 2019 - present

Supervised by Prof. Yang Liu. Here is a list of ongoing and finished projects.

- Cross-domain Deep Learning Based Spine MRI Segmentation
- Development of a Spine Surgical Navigation System with Surgical Tool Tracking and AR Capabilities
- Implementation of a DL Based Spine Segmentation Model on a Xilinx FPGA Platform
- Deep Learning Based Spine MRI Segmentation
- Deep Learning Based Fluorescence-to-Color Image Registration
- Thresholding Based Mouse Cochlea CT Image Segmentation

Graduate Teaching Assistant — Aug. 2019 - May 2020

Served as TA for the following courses.

- ECE:3540:0001 Communication Networks, Fall 2019
- ECE:3700:0001 Electromagnetic Theory, Fall 2019
- ECE:2410:0AAA Principles of Electronic Instrumentation, Spring 2020
- ECE:5500:0001 Communication Theory, Spring 2020

Peking University

Undergraduate Research Intern — Feb. 2019 - May 2019

Worked on a project focusing on deep learning based human pose estimation. This is my undergraduate degree thesis project. Supervised by Prof. Yadong Mu.

Nanyang Technological University

Undergraduate Summer Research Intern — July 2018 - Aug. 2018

Worked on a project focusing on deep learning based 3D indoor object detection. Collaborated with Dr. Li Wang and supervised by Prof. Hock Soon Seah.

University of Science and Technology of China

Undergraduate Research Assistant — Dec. 2017 - June 2018

Worked on a project focusing on designing a GUI for a deep learning based image recommendation system. Supervised by Prof. Dong Liu.

Chinese Academy of Sciences
Undergraduate Summer Research Intern July 2017 - Aug. 2017

Worked on a project focusing on alignment and mergence of 3D forest point clouds which were generated from laser-gated ranging technique. Supervised by Prof. Xinwei Wang.

Projects

Implementation of a DL Based Spine Segmentation Model on a Xilinx FPGA Platform

Supervisor: Prof. Yang Liu | Oct. 2021 - Jan. 2022 | Link to Project Demo

- In this project, we implemented a trained UNet model on a Xilinx FPGA development SoM, Ultra96-v2. The UNet model achieved accurate spine MRI segmentation on both FPGA and GPU. Vitis AI toolkits were used in the implementation process.

Deep Learning Based Spine MRI Segmentation

Supervisor: Prof. Yang Liu | Jan. 2021 - June 2021 | Link to Project Demo

- In this project, we proposed a deep network named Res50_UNet for spine MRI segmentation. Res50_UNet combines the architectural characteristics of UNet and FPN and can achieve accurate segmentation on spine MRI images.

Deep Learning Based Fluorescence-to-Color Image Registration

Supervisor: Prof. Yang Liu | Jan. 2021 - June 2021 | Link to Project Demo

- In this project, we built a fluorescence imaging system to capture both color image and fluorescence image. We achieved fluorescence-to-color image registration with image features extracted by a deep network model, VGG-16.

Thresholding Based Mouse Cochlea CT Image Segmentation

Supervisor: Prof. Yang Liu | Oct. 2019 - Feb. 2020 | Link to Project Demo

- In this project, we used OpenCV-Python library to process mouse cochlea CT images. Combining thresholding and contour extracing, we finally achieved good segmentation results.

Deep Learning Based 3D Object Detection in Indoor Environment

Supervisor: Prof. Hock Soon Seah | July 2018 - Aug. 2018 | Link to Project Demo

- In this project, We used Mask R-CNN to get 2D object bounding boxes and segmentation masks, then located objects in 3D point clouds based on 2D detection results.

GUI Design for a Deep Learning Based Image Recommendation System

Supervisor: Prof. Dong Liu | Dec. 2017 - June 2018 | Link to Project Demo

- In this project, I designed a Graphical User Interface (GUI) for a deep learning based image recommendation system. Users can select their favored images and add them to the training set to update the recommendation model. Recommended images based on users' decisions can also be displayed on this GUI.

Alignment and Mergence of Forest Point Clouds

Supervisor: Prof. Xinwei Wang | July 2017 - Aug. 2017 | Link to Project Demo

- In this project, I worked on how to align several forest point clouds. These point clouds were generated by depth images and the depth information was obtained by laser range-gated imaging technique. MATLAB point cloud processing toolkits were used in this project.